

Before the

**COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY**

Complaint of Fiber Technologies Networks, L.L.C.  
pursuant to G.L. c. 166, § 25A and 220 C.M.R. §  
45.00 et seq. regarding access to poles owned or  
controlled by Shrewsbury's Electric Light Plant

**DTE 01-70**

Direct Testimony and Exhibit of

**SCOTT C. LUNDQUIST**

witness for

Fiber Technologies Networks, L.L.C.

November 9, 2001

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**Exhibit**

INTRODUCTION

**Qualifications**

Q. Please state your name, position and business address.

A. My name is Scott C. Lundquist. I am Vice President of Economics and Technology, Inc., (“ETT”), Two Center Plaza, Suite 400, Boston, Massachusetts 02108. Economics and Technology, Inc. is a research and consulting firm specializing in telecommunications economics, regulation, management and public policy.

Q. Please summarize your educational background and previous experience in the field of telecommunications regulation and policy.

A. I have prepared a Statement of Qualifications, which is attached hereto as Attachment 1.

Q. Have you previously testified as an expert in telecommunications regulatory proceedings?

A. Yes. I have appeared as an expert witness on telecommunications matters before state public utility commissions (PUCs) on fourteen prior occasions, including appearances in Alabama, California, Connecticut, Hawaii, Nevada, New Jersey, Ohio, Texas, Washington state, and Wisconsin. Many of these cases have required that I analyze the costs for local exchange carriers’ (“LECs”)

1 networks and services, relative to such issues as the restructuring of access service tariffs, the  
2 development of cost-based rates for unbundled network rate elements (“UNEs”), and the  
3 arbitration of interconnection agreements.

4  
5 Q. Have you previously testified before the Massachusetts Department of Telecommunications and  
6 Energy (“DTE” or “Department”)?

7  
8 A. No, this is my first appearance before the Department.

9  
10 **Assignment**  
11

12 Q. Mr. Lundquist, what was your assignment in this proceeding?

13  
14 A. ETI was engaged by Fiber Technologies Networks, L.L.C. (“Fibertech”) to provide expert  
15 testimony addressing the nature of dark fiber services offered by carriers such as Fibertech, and  
16 the role of dark fiber offerings in the development of facilities-based competition for  
17 telecommunications services, as these issues pertain to Fibertech’s August 27, 2001 complaint  
18 filing with the Department regarding Fibertech’s unsuccessful attempts to gain access to poles  
19 owned or controlled by Shrewsbury's Electric Light Plant (“SELP”).

1 **Summary of Testimony**

2  
3 Q. Please summarize the testimony you are presenting at this time.

4  
5 A. The first section of my testimony addresses the nature of dark fiber and its evolution from a carrier  
6 facility to an important wholesale communications service in its own right. I explain that “dark  
7 fiber” refers to optical fibers that have been deployed between various geographic locations, but  
8 not yet connected to the electronics that are needed to activate (“light”) the dark fiber and use it to  
9 provide a digital communications capability. Of course, the value of dark fiber lies in its ability to  
10 be “lit” and employed in a communications network for the purpose of transmitting intelligence or  
11 information from one place to another. My testimony reviews the deployment of fiber transmission  
12 systems since the 1980s, and explains that the enormous growth in data rates achievable on an  
13 individual fiber strand has encouraged the development of a wholesale services market for dark  
14 fiber. Regulators, including the DTE and FCC, have responded to this development, by  
15 recognizing that dark fiber constitutes a new communications service, and requiring the incumbent  
16 LECs to offer dark fiber on an unbundled basis to their competitors.

17  
18 In the second section of my testimony, I provide an overview of the market for wholesale dark  
19 fiber services in Massachusetts. I describe several common carriers that offer these services,  
20 including Verizon New England, American Fiber Systems, Metromedia Fiber Network, and  
21 others. I explain that, in a competitive telecommunications market, end users and carriers expect  
22 and demand a wide range of service options, with varying tradeoffs between such factors as a

1 service's flexibility, complexity, cost, and the level of management and financial responsibility borne  
2 by the customer. I show that dark fiber increases those options, and is particularly attractive to  
3 customers who foresee rapid growth in their demand for bandwidth. I illustrate this point with two  
4 examples of new competitive entrants, CTC Communications and Choice One Communications,  
5 who are have made acquisition of dark fiber a key element of their business plans and network  
6 growth strategies. Finally, I show that the increasing use of dark fiber can be viewed as part of the  
7 continued evolution of telecommunications services, away from the historical model of the  
8 monolithic telephone company that provides all services – which at one time included the telephone  
9 sets on either end of a call – to a marketplace in which competition and consumer choice  
10 stimulates a wide and continuously-changing spectrum of different telecommunications solutions.

## WHOLESALE DARK FIBER SERVICES

**Dark fiber has evolved from a limited function as carriers' transmission capacity reserves into an important wholesale communications service offering in its own right.**

Q. Mr. Lundquist, what are the basic elements of a fiber optic transmission system?

A. A fiber optic transmission system generally consists of three basic elements:

- (1) The *fiber optic cable*, which contains a bundle of glass fibers (strands), each of which can transmit light signals that digitally encode information, including voice communications, digital data, or television programming that is delivered to “remote terminals” for cable television distribution. Because fiber optic cables transmit light in only one direction, a two-way system will require two strands.

(2) The *light source transducer*,<sup>1</sup> which is the digital electronic system that translates incoming electronic signals into optical signals that are transported along the fiber strands.

(3) The *light detector transducer*, which receives the optical signals and converts them back into electronic signals.

1. A “transducer” is used to convert a signal from one form of energy to another. See, e.g., Harry Newton, *Newton’s Telecom Dictionary*, 17<sup>th</sup> Edition (CMP Books), at page 709.

1 In addition, because fiber optic systems typically operate at very high capacities,<sup>2</sup> they are usually  
2 used in conjunction with digital multiplexing/demultiplexing equipment at both ends, which  
3 aggregates/disaggregates individual communications paths (e.g., voice grade channels).

4  
5 Q. What is “dark fiber”?

6  
7 A. As a technical matter, “dark fiber” simply refers to optical fibers within fiber cables that have been  
8 deployed between various geographic locations, but not yet connected to any electro-optic  
9 transducers and associated multiplexers. Once those electronics have been added, a dark fiber  
10 facility is activated (“lit”) and used to provide a digital communications capability. The FCC has  
11 defined “‘dark’ fiber service” as the “provision and maintenance of fiber optic transmission  
12 capacity between customer premises where the electronics and other equipment necessary to  
13 power or “light” the fiber are provided by the customer, not the local exchange carrier (LEC).”<sup>3</sup>

---

2. For example, Lucent Technologies offers a long-haul optical transmission system called the Wavestar™ OLS 1.6T, which offers 800 gigabits per second (Gbps) capacity per fiber strand in its initial installation, and is expandable to 1.6 terabits per second (Tbps). Source: [http://www.lucent.com/liveline/152114\\_Brochure.pdf](http://www.lucent.com/liveline/152114_Brochure.pdf), accessed 11/8/01.

3. *In the Matter of Southwestern Bell Telephone Company, US West Communications, Bell Atlantic Telephone Companies, BellSouth Telephone Companies Applications for Authority Pursuant to Section 214 of the Communications Act of 1934 to Cease Providing Dark Fiber Service*, File No. W-P-C-6670 *et al*, Memorandum Opinion and Order, released March 29, 1993 (“Dark Fiber Tariffs Order”), at para. 1.



1 Q. Mr. Lundquist, are wholesale dark fiber services used for any purpose other than the creation of  
2 communications networks by the customers who purchase them?

3  
4 A. No, not to my knowledge. The value of dark fiber lies in its ability to be employed in a  
5 communications network for the purpose of transmitting intelligence or information from one place  
6 to another. When customers buy a wholesale dark fiber service from Verizon, Fibertech or any  
7 other supplier of such services, they do so in order to create a communications network that can  
8 transmit signals (intelligence or information) between various locations.

9  
10 Q. Is the development of a wholesale market for dark fiber a relatively new phenomenon in the  
11 telecommunications industry?

12  
13 A. Yes, it is. When optical fiber transmission systems were first introduced into telecommunications  
14 networks in the 1980s, they tended to be cost-effective for longer-haul routes only, and therefore  
15 were first deployed extensively by interexchange carriers ("IXCs"). In addition, however, other  
16 holders of rights-of-way, such as railroad companies and electric utilities, laid fiber along their  
17 routes and began offering service as a "carrier's carrier," leasing fiber transmission capacity on a  
18 wholesale basis (typically over lit fibers) to the IXCs. Moreover, as optical fiber technology  
19 continued to evolve and its economics improved, the incumbent local exchange carriers ("ILECs")  
20 also began to deploy fiber transmission systems, first in their interoffice networks, and  
21 progressively further out from their central offices in their local exchange loop plant, in a process

1 that is still underway. Initially, carriers and wholesale suppliers of fiber transmission services  
2 considered dark fiber mainly as an internal resource; their focus was principally upon the  
3 transmission capabilities of lit fibers, and unlit fiber strands were simply viewed as transmission  
4 capacity held in reserve, potentially to serve future demand growth.

5  
6 However, in recent years, new techniques have been developed for expanding by orders of  
7 magnitude the data transmission rates achievable on individual fiber strands.<sup>4</sup> The development of  
8 these techniques has meant that in many cases carriers have been able to expand the capacity of  
9 their fiber transmission systems by upgrading their electronics, rather than by activating spare dark  
10 fibers or installing new fibers. One consequence of this development has been that dark fiber has  
11 shifted from being viewed as solely an internal carrier reserve inventory resource to an asset that  
12 can be offered as a wholesale service in its own right. The Bell operating companies ("BOCs")  
13 began offering dark fiber as a wholesale service under Individual Case Basis ("ICB") pricing in the  
14 1980s, and, at the FCC's direction, they filed general tariffs for dark fiber in 1990. Since that  
15 time, the number of suppliers of dark fiber services has grown considerably.

16  
17 Q. Has the FCC determined that dark fiber is a communications service?  
18

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4. For example, Dense Wavelength Division Multiplexing (DWDM) allows the simultaneous use of many wavelengths along a single fiber strand instead of a single wavelength, thereby multiplying the transmission capacity of the strand. See Gary Stix, "The Triumph of the Light," *Scientific American*, January 2001, at pages 82-83. This article is reproduced in my Exhibit.

1 A. Yes. In 1990, several of the BOCs attempted to withdraw their general tariffs for dark fiber  
2 service, claiming that (among other arguments) their offering of dark fiber service did not constitute  
3 a communications service, but instead should be characterized as a construction of facilities.<sup>5</sup> In  
4 the 1993 *Dark Fiber Tariffs Order*, the FCC rejected that argument, and concluded that the  
5 BOCs' dark fiber offerings were communications services (*i.e.*, "wire communications" under the  
6 *Communications Act of 1934*).<sup>6</sup> In support of that conclusion, the FCC found that "[d]ark fiber  
7 service permits the transmission of information, by other like connection, between two or more  
8 customer premises (using customer-provided electronics)" and that "the fact that the customer, and  
9 not the carrier, provides the electronics to power the dark fiber is simply irrelevant to our  
10 determination that dark fiber service constitutes a "communication by wire" under the Act."<sup>7</sup> The  
11 FCC also reiterated that conclusion in its June 1997 decision addressing Section 272 restrictions  
12 on BOC provision of in-region interLATA services.<sup>8</sup>

13  
14 Q. Has the Department previously determined that dark fiber service is a telecommunications service?  
15

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5. *Dark Fiber Tariffs Order*, at para.13.

6. 47 U.S.C. 153.

7. *Dark Fiber Tariffs Order*, at paras. 17-18 (footnote omitted).

8. *In the Matter of Implementation of Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, as Amended*, CC Docket No. 96-149, *Second Report on Reconsideration*, released June 24, 1997 ("*Non-Accounting Safeguards Order*"), at para. 54, footnote 110.

1 A. Yes, that is my understanding. The Department issued a decision in Docket 98-116 that agreed  
2 with the FCC's conclusion in the *Non-Accounting Safeguards Order* that the leasing of dark  
3 fiber extending across LATA boundaries would constitute an interLATA communications service.<sup>9</sup>  
4 Counsel advises me that the Department's finding was subsequently upheld by the U.S. District  
5 Court for the District of Massachusetts.<sup>10</sup>

6  
7 Q. Has the FCC required the ILECs to make dark fiber available to competitors on a wholesale  
8 basis?

9  
10 A. Yes, it has. When the FCC issued its August 1996 *Local Competition Order* in CC Docket 96-  
11 98,<sup>11</sup> it did not include dark fiber as a required unbundled network element ("UNE"). However, in  
12 its November 1999 *UNE Remand Order* in the same proceeding,<sup>12</sup> the FCC subsequently added

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9. *In the Matter of the Petition of Global Naps, Inc. against New England Telephone and Telegraph d/b/a Bell Atlantic-Massachusetts regarding dark fiber*, MA. D.T.E. 98-116, *Order*, April 14, 2000.

10. *Global NAPs, Inc. v. New England Tel. & Tel. Co.*, 156 F. Supp. 2d 72 (D. Mass., July 11, 2001).

11. *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 and Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers*, CC Docket Nos. 96-98 and 95-185, *First Report and Order*, released August 8, 1996 ("*Local Competition Order*"). This is the order that originally established the FCC rules that implemented the network interconnection and unbundling requirements of the *Telecommunications Act* that are applicable to the ILECs.

12. *In the Matter of Implementation of the Local Competition Provisions of the*

(continued...)

1 dark fiber to the list of UNEs that ILECs must make available. Specifically, the FCC reaffirmed its  
2 prior conclusion that ILEC loops and interoffice transmission facilities must be made available to  
3 competitors on an unbundled basis, but extended the definition of those elements to include the  
4 dark fiber associated with working loop and interoffice transmission facilities.<sup>13</sup> The FCC believed  
5 that making the ILECs' dark fiber and other UNEs available to the marketplace was a crucial step  
6 towards realizing the *Telecommunications Act's* goals for diversity of supply in  
7 telecommunications services and the development of facilities-based competition, investment and  
8 innovation.<sup>14</sup>

9  
10 Q. Just to make it clear, are you saying that even though dark fiber is by definition not actually  
11 carrying any telecommunications signals, the FCC has nonetheless ordered that ILECs make it  
12 available as a UNE?  
13

---

12. (...continued)

*Telecommunications Act of 1996*, FCC CC Docket No. 96-98, *Third Report and Order and Fourth Further Notice of Proposed Rulemaking*, rel. November 5, 1999 (FCC 99-238) ("*UNE Remand Order*"), at paras. 165-167 and 174, and Appendix C (Final Rules). The *UNE Remand Order* was the FCC's response to a Supreme Court ruling that directed the FCC to (among other things) improve the standards by which the FCC determined ILECs' network unbundling obligations under Section 251(c)(3) of the *Act*.

13. *Id.*, at paras. 174 and 326.

14. See, e.g., *id.* at paras. 107-110.

1 A. Yes, because the FCC considers the unlit strands in an installed fiber optic cable to be part of the  
2 ILEC's network, which the ILECs is required by Sec. 251(c)(3) to make available "on an  
3 unbundled basis at any technically feasible point." Bear in mind that these so-called "dark fiber"  
4 strands that are provided by an ILEC or another telecommunications carrier will obviously cease  
5 to be "dark" as soon as the entity that leases them starts using them to transmit telecommunications  
6 signals. And of course that is the only reason why someone would want to lease "dark fiber" –  
7 i.e., to "light" it and to use it to transmit telecommunications signals.

8  
9 Q. Does the FCC make a distinction between installed dark fiber and uninstalled transmission facilities  
10 that a carrier might also maintain in its inventory, such as a spool of fiber optic cable?

11  
12 A. Indeed it does. In the *UNE Remand Order*, the FCC found that dark fiber is clearly  
13 distinguishable from transmission facilities that have yet to be installed, because dark fiber is  
14 installed and ready to provide service (i.e., as soon as the appropriate electronics are attached). In  
15 the Commission's words:

16 We acknowledge that it would be problematic if some facilities that the incumbent LEC  
17 customarily uses to provide service were deemed to constitute network elements (*e.g.*,  
18 unused copper wire stored in a spool in a warehouse). Defining such facilities as network  
19 elements would read the "used in the provision" language of section 153(29) too broadly.  
20 Dark fiber, however, is distinguishable from this situation in that it is physically connected to  
21

1 the incumbent's network and is easily called into service. Thus, as indicated above, we  
2 conclude that dark fiber falls within the statutory definition of a network element.<sup>15</sup>

3  
4 Q. Has the Department also determined that ILEC dark fiber must be offered as a UNE?

5  
6 A. Yes, in fact the Department made that determination several years before the FCC did, in the  
7 *Phase 3 Order* issued in the consolidated proceeding addressing interconnection arbitrations,  
8 D.P.U. Docket Nos. 96-73/74 *et al.*<sup>16</sup>

9  
10 Q. Do carriers other than the ILECs offer dark fiber on a wholesale basis?

11  
12 A. Yes, they do. If anything, the tariffing of dark fiber offerings by the ILECs appears to have  
13 stimulated, rather than deterred, the growth of alternative sources of dark fiber services. While the  
14 ILECs' networks are generally ubiquitous within their serving areas, their stock of dark fiber along  
15 any particular route may be fixed, and the amount of dark fiber on a given route that is available for  
16 resale may be limited when the ILEC's own spare capacity requirements are taken into account.  
17 Second, geographic redundancy of network routes has emerged as an important consideration in

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15. *UNE Remand Order*, at para. 328 (citation omitted).

16. Consolidated Arbitrations, D.P.U. 96-73/74, 96-75, 96-80/81, 96-83, 96-94, *Phase 3 Order*, December 4, 1996 ("*Phase 3 Order*"), at 42.

1 the design of telecommunications networks, and alternative dark fiber suppliers may be able to  
2 provide routings that are physically distinct from those being offered by the ILECs. And third,  
3 some alternative dark fiber suppliers may be able to compete on price with the ILECs' offerings,  
4 particularly if ILECs manage to establish "cost"-based prices for unbundled dark fiber that are  
5 based upon inflated estimates of their economic cost.

6  
7 **Dark fiber is an integral part of the spectrum of telecommunications services that have**  
8 **become available to end users and carriers since the introduction of competition into the US**  
9 **and Massachusetts telecommunications markets.**  
10

11 Q. Can you give an overview of the market for wholesale dark fiber services in Massachusetts?  
12

13 A. Yes. There are several common carriers that offer wholesale dark fiber services in Massachusetts.  
14 In response to the Department's *Phase 3 Order* and the FCC's *UNE Remand Order* that I have  
15 just discussed, Verizon New England ("Verizon NE") provides dark fiber on an unbundled basis  
16 pursuant to a tariff filed with the Department.<sup>17</sup> As set forth in that tariff, Verizon NE offers dark  
17 fiber along its network routes, where spare dark fiber is available, with a minimum of two fiber  
18 strands per route.<sup>18</sup> Verizon NE's tariffed charges for dark fiber include monthly rates per pair,

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17. See Verizon NE tariff DTE MA No. 17 ("Unbundled Dark Fiber").

18. *Id.*, Part B, Section 17, original page 1 (effective September 14, 2000).



1 per wire center (including a fixed charge and a charge per 1/10 mile), plus additional charges for  
2 such items as network transport engineering design or planning.<sup>19</sup>

3  
4 A second dark fiber supplier operating in the Commonwealth is American Fiber Systems (“AFS”).

5 AFS describes its dark fiber products on its website as follows:

6 [w]e design, build, lease and maintain high-capacity, high-bandwidth dark fiber-optic  
7 networks, constructed on a full-spectrum fiber and completely connected to a city’s most  
8 important points of communications presence: ILEC and CLEC central offices; ISP and ASP  
9 facilities; Interexchange “carrier hotels;” Wireless providers and cable company head ends,  
10 and Fortune 1000 companies.<sup>20</sup>  
11  
12

13 AFS has constructed or plans to construct dark fiber networks in greater Springfield, Worcester,  
14 and the Lowell-Lawrence-Haverill area.<sup>21</sup> According to the AFS website, it offers dark fiber on  
15 these networks under fixed-price, twenty-year leases.<sup>22</sup>  
16

17 A third provider of dark fiber services in Massachusetts is Metromedia Fiber Network (“MFN”).

18 MFN states that its “current network build consists of networks in Boston, Chicago, Dallas,

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19. *Id.*, Part M, Section 2, original page 27 (effective September 14, 2000).

20. Source: [http://www.americanfibersystems.com/html/what/what\\_main.html](http://www.americanfibersystems.com/html/what/what_main.html), accessed 11/7/01.  
This page is reproduced in my Exhibit.

21. Source: <http://www.americanfibersystems.com/maps>, accessed 11/7/01. The basic AFS maps  
for each of these networks is reproduced in my Exhibit.

22. Source: [http://www.americanfibersystems.com/html/what/what\\_network.html](http://www.americanfibersystems.com/html/what/what_network.html), accessed  
11/7/01. This page is reproduced in my Exhibit.

1 Houston, Los Angeles, New York, Philadelphia, San Francisco, Seattle, and Washington, D.C.”<sup>23</sup>

2 Its Boston-area network encompasses not only downtown Boston, but also extends out to  
3 Waltham, Lexington, and Burlington (see the MFN network map reproduced in my Exhibit).

4  
5 Another Massachusetts dark fiber supplier is NEES Communications, Inc. (“NEESCom”).

6 NEESCom, which began as a telecommunications offshoot of the former New England Electric  
7 System (“NEES”), offers dark fiber along a four-state network, including a route between Boston  
8 and Albany.<sup>6</sup>

9  
10 In addition, NEON Communications, Inc. leases dark fiber along selected routes of its fiber optic  
11 network, which “extends from Portland, Maine through Boston, New York, Philadelphia and  
12 Baltimore, to Washington, D.C.”<sup>7</sup> A map of the NEON network is reproduced in my Exhibit.

13  
14 Finally, as explained more fully in the testimony of Mr. Chiaino, Fibertech is providing dark fiber  
15 services in Connecticut and New York, and plans to serve the Springfield and Worcester areas in  
16 Massachusetts. My understanding is that Fibertech has requested pole attachments from SELP in

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23. Source: [http://www.mmfnc.com/mfn/products/pn\\_overview.jsp](http://www.mmfnc.com/mfn/products/pn_overview.jsp). This page is reproduced in my Exhibit.

6. Source: <http://www.neescom.com/news/index.htm>, accessed 11/07/01. This page is reproduced in my Exhibit.

7. *NEON Communications: Dark Fiber Services*, downloaded from <http://www.neoninc.com>, accessed 11/07/01. This page is reproduced in my Exhibit.

1 order to extend its fiber network into Shrewsbury, for the purpose of providing dark fiber service  
2 and possibly lit fiber services at a future date.

3  
4 Q. How does the dark fiber services market fit into the larger market for competitive telecom-  
5 munications services?

6  
7 A. Dark fiber represents a relatively new means by which alternatives to traditional ILEC  
8 telecommunications services can be provided. One can consider the variety of competitive  
9 telecommunications options available to end users as a spectrum. At one end are the traditional  
10 retail ILEC services, in which customers receive services that are essentially commodities, typically  
11 priced on a usage-sensitive basis and completely controlled and managed by the ILEC on a “turn-  
12 key” basis. On the other end are private communications networks, which are customized for a  
13 particular end user’s needs, funded directly by the end user, and capable of being directly  
14 controlled and managed by the end user. Between those two extremes, there is a wide variety of  
15 service configurations from which a sophisticated end user may choose, depending upon the user’s  
16 capabilities, requirements and preferences with respect to tradeoffs between such considerations  
17 as flexibility in the use of the service, its complexity and cost, the level of management responsibility  
18 that the user must assume, and the degree of financial risk borne by the customer versus the service  
19 supplier.<sup>8</sup> In similar fashion, competitive carriers (e.g., CLECs, CAPS, and IXC) have some

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8. Of course, not all end users are equal in this respect; residential retail customers, for example, may not have the demand requirements, economic resources, or technical sophistication to consider  
(continued...)

1 ability to choose between turn-key services available for resale (such as wholesale long distance  
2 service, or the ILECs' total service resale offerings made available pursuant to Section 251(c)(4)  
3 of the *Act*), construction and operation of their own facilities-based networks, or any number of  
4 combinations of self-provisioned and leased facilities or services. The availability of wholesale  
5 dark fiber services expands the range of options available for both end users and competitive  
6 carriers.

7  
8 Q. What types of customers are attracted to wholesale dark fiber services?

9  
10 A. Wholesale dark fiber services are used by customers to create communications networks<sup>9</sup> for the  
11 provision of common carrier services offered to the public, or to configure private  
12 telecommunications networks, such as corporate data networks, for example. Accordingly, the  
13 customer base for commercially-available dark fiber services includes competitive local exchange  
14 carriers ("CLECs"), data LECs ("DLECs"), competitive access providers ("CAPS"), and  
15 interexchange carriers ("IXCs"), as well as private sector "enterprise" customers – i.e., large  
16 businesses, government agencies, educational institutions, hospitals, and other entities that want to  
17 have a high-speed telecommunications network dedicated to their own use. Dark fiber is

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8. (...continued)  
anything other than turn-key services from the ILEC or CLECs (where the latter offer service).

9. By "communications networks," I am referring both to telecommunications networks (that provide two-way voice and/or data transmission, for example) and cable television networks (that provide one-way broadcast of television signals over wireline facilities).

1 particularly attractive to customers who foresee rapidly growing demand for bandwidth. One of  
2 the distinguishing characteristics of dark fiber services is that they offer customers access to  
3 transmission capacity on a *physical* basis, through the exclusive use of individual fiber strands,  
4 rather than in terms of a logical derived channel capacity or bandwidth. This gives the customer  
5 much greater control over the utilized capacity and associated costs for that transmission link, and  
6 the ability to scale that capacity up (or down) over time in line with the customer's actual needs, by  
7 replacing the electronics at either end. In contrast, when a customer purchases a "lit" fiber  
8 transmission service with a finite channel capacity, such as a DS1 or DS3 dedicated private line,  
9 the service's bandwidth and costs are essentially fixed, and the customer would need to buy  
10 additional private lines (assuming they are available and reasonably priced) whenever its demand  
11 exceeded that service's capacity limits.

12  
13 Q. Can you give any illustrations of how dark fiber is being used to provide competitive  
14 telecommunications services in Massachusetts?

15  
16 A. Yes. CTC Communications is a relatively new competitive carrier that bills itself as a "rapidly  
17 growing 'next generation' Integrated Communications Carrier utilizing advanced technology and  
18 providing its customers with converged voice, data, Internet and video services on a broadband,  
19 packet-based network."<sup>10</sup> CTC serves medium and larger-sized businesses in the Northeast,

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10. CTC Communications Press Release, "CTC Expands the Reach of its Fiber Network in  
Massachusetts by Adding 11 New Fiber Access Locations," September 26, 2001, at page 2. Source:  
(continued...)

1 including the Boston area.<sup>11</sup> CTC indicates that its use of dark fiber services has been an  
2 important part of its growth strategy:

3  
4 CTC purchased both long haul and metro/suburban dark fiber under 20 year Irrefutable Right  
5 of Use (IRU) Agreements in late 2000 and 2001 from a variety of dark fiber suppliers. The  
6 Company is progressively taking delivery of this dark fiber, “lighting it up” using Cisco  
7 optronics and will be providing fiber access to its network in over 60 locations throughout the  
8 New England and Mid-Atlantic states by year end 2001.<sup>12</sup>  
9

10 A second example is Choice One Communications, another new competitive carrier, which offers  
11 small and medium-sized businesses in smaller cities in the Northeast and Midwest a wide range of  
12 telecommunications services, including voice and high-speed data. Choice One has signed a  
13 Master Facilities Agreement with Fibertech under which Choice One will obtain a 20-year lease  
14 for dark fiber from Fibertech in at least thirteen cities.<sup>13</sup> The agreement also gives Choice One the  
15 option to lease additional fiber where Fibertech plans to expand its network of fiber.<sup>14</sup> Choice  
16 One’s CEO specifically noted that this arrangement fits well with its network growth strategy:

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10. (...continued)

<http://www.ctcnet.com>, downloaded 11/07/01. This document has been reproduced in my Exhibit.

11. *Id.* at page 2.

12. *Id.* at page 1.

13. Choice One Communications Press Release, “Fiber Technologies and Choice One Communications Enter into a 20-year, \$100 Million Master Facilities Agreement,” June 12, 2000, at page 1. Source: <http://www.choiceonecom.com/news>, accessed 11/07/01. See my Exhibit for a copy of this document.

14. *Id.* at page 1.

1  
2 Fiber deployment provides the bandwidth necessary to support substantial incremental  
3 growth, allows us to optimize our network cost and enhances the quality and reliability of our  
4 networks. Fiber Technologies has a solid management team with the capability and financing  
5 to build networks where we need them and on a schedule that fits our business plans.<sup>15</sup>  
6

7 The testimony of Mr. Chiaino provides some further information concerning the agreement  
8 between Choice One and Fibertech. Clearly, both of these competitive carriers has found the  
9 availability of wholesale dark fiber services to be an important component to the development and  
10 expansion of their facilities-based competitive services.  
11

12 Q. How does dark fiber fit into the overall spectrum of telecommunications services that are presently  
13 being offered and used?  
14

15 A. The US and international telecommunications marketplace has undergone evolutionary and  
16 revolutionary changes over the past three decades. At the time that the *Communications Act of*  
17 *1934* became law and up through the FCC's landmark *Carterphone* decision,<sup>16</sup> we thought of  
18 telecommunications services as running literally from the calling party's telephone set to the  
19 recipient's telephone set, because the two handsets and everything in between was provided by  
20 "the phone company." Over time, that monolithic view of telecommunications has undergone

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15. *Id.* at page 1.

16. *In the Matter of Use of the Carterphone Device in Message Toll Telephone Service*, 13 FCC2d 420 (1968). In its *Carterphone* decision, the FCC rescinded the outright prohibition of "foreign attachments" such as non-telco terminal equipment to the public telephone network.

1 enormous change, as some (former) network functions, such as the telephone handsets and other  
2 “customer premises equipment” (“CPE”) were removed from the purview of the telephone  
3 company and transferred to the customer. A decade later, responsibility for the provision of  
4 “local” vs. “long distance” services was divided between local exchange carriers (“LECs”) and  
5 IXC. Today, a multiplicity of carriers provide network elements to each other and to end users.  
6 CAPs provide interoffice transmission facilities to CLECs and IXCs, and provide subscriber line  
7 facilities to end users. Specialized fiber optic network carriers provide both “lit” and “unlit”  
8 services to CAPs, CLECs, IXCs and end users. Sometimes the customer provides its own  
9 electronics and other times utilizes electronics provided by the carrier. Sometimes the customer  
10 buys the entire capacity of a fiber strand, other times the customer may purchase specific  
11 bandwidth capacity. The point here is that all of these specialized providers bring a richness of  
12 choice, diversity, redundancy and innovation to a market that is anything but monolithic. All of  
13 these services fall within the scope of telecommunications as that term is understood and used  
14 today.



CONCLUSION

**Recommendations**

Q. Mr. Lundquist, please summarize your recommendations to the Department at this time.

A. Based on the facts presented in my testimony, I believe that the Department should adopt the following findings as the basis for its resolution of Fibertech's complaint:

1. Wholesale dark fiber services, including those offered by Fibertech in Massachusetts, are communications services used for the purpose of transmitting intelligence or information from one place to another; and
2. The availability of wholesale dark fiber services offered by Fibertech and other such carriers promotes the development of facilities-based competition for telecommunications services in Massachusetts;

Q. Does that conclude your direct testimony at this time?

A. Yes, it does.